SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

CIVIL ENGINEERING

Syllabus for

T.E. (Civil Engineering)

w. e. f. Academic Year 2016-17

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology (Revised from 2014-2015)

Credit System structure of T. E. Civil-I, W. E. F. 2016-2017; Semester- V

Theory Course Name	Hrs./week				Credits	Examination Scheme				
	L	T	P	D		ISE	ESE		ICA	Total
Design of Steel Structures	3	-	-	-	3	30	70		-	100
Geotechnical Engg.I	3	-	-	-	3	30	70		-	100
Building Planning & Design	3	-	-	-	3	30	70		-	100
Environmental Engg.I	3	-	-	-	3	30	70		-	100
Engineering Management- I	3	-	-	-	3	30	70		25	125
Transportation Engg.-I	3	-	-	-	3	30	70		-	100
Self Learning (H.S.S. course)	-		-	-	2	-	50		-	50
Total	**18**				**20**	**180**	**470**		**25**	**675**
Laboratory/Drawings							**POE**	**OE**		
Design of Steel Structures	-	-	2	-	1	-	-	-	25	25
Geotechnical Engg.I	-	-	2	-	1	-	25	-	25	50
Building Planning & Design	-	-	-	4	2	-	-	25	25	50
Environmental Engg.I	-	-	2	-	1	-	-	-	25	25
Transportation Engg.-I	-	-	2	-	1	-		-	25	25
Total	-	-	**8**	**4**	**6**	-	**50**		**125**	**175**
Grand Total	**18**		**8**	**4**	**26**	**180**	**520**		**150**	**850**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing. *- Alternate week, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

Note:

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology (Revised from 2013-2014)

Credit System structure of T. E. Civil-II, W. E.F. 2016-2017; Semester - VI

Theory Course Name	Hrs./week				Credits	Examination Scheme				
	L	T	P	D		ISE	ESE		ICA	Total
Structural Mechanics-III	4	-	-	-	4	30	70		-	100
Geotechnical Engg.II	4	-	-	-	4	30	70		-	100
Environmental Engg.II	3	-	-	-	3	30	70		-	100
Engineering Management- II	4	-	-	-	4	30	70		-	100
Transportation Engg.-II	3	-	-	-	3	30	70		25	125
Self Learning (Technical course)	-	-	-	-	2	-	50		-	50
Total	18	-	-	-	20	150	400		25	575
Laboratory/Drawings:						-	POE	OE		
Structural Mechanics-III	-	-	2	-	1	-	-	-	25	25
Geotechnical Engg.II	-	-	2	-	1	-	-	-	25	25
Environmental Engg.II	-	-	2	-	1	-	-	25	25	50
Engineering Management- II	-	-	2	-	1	-	-	25	25	50
Steel Structural Design & Drawing	-	-		4	2	-	-	25	50	75
Mini project (Any subject in Civil Engg.)	-	-	-	-	1	-	-	-	25	25
Assessment of field training report	-	-	-	-	-				25	25
Total	-	-	8	4	7			75	200	275
Grand Total	20	-	8	2	27	150	475		225	850

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

Note:

(1) Students shall undergo a field training of 15 days in the winter vacation after T.E. Part I and submit the field training report, which shall be assessed by faculty associated with Engineering Management- II in T.E. Part II.

(2) Students shall undergo a field training of 15 days in the summer vacation after T.E. Part II. The training report shall be assessed in B.E. Part -I by the concerned project guides.

(3) Term work assessment: Term Work assessment shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, syllabus, report presentation etc., as applicable.

(4) Syllabus of Self learning (H.S.S.) is common for all Under Graduate Programs under Faculty of Engineering and Technology.

(5) The batch size for the practical/tutorial is of 15 students. On forming the batches, if the number of remaining students exceeds 7 students, then a new batch be formed.

T.E. (CIVIL ENGINEERING) PART- I

DESIGN OF STEEL STRUCTURES

Teaching Scheme:

Lectures: 3 hours per week
Practical: 2 hours per week

Examination Scheme:

Theory paper: 100 marks
Term work: 25 marks

Course Objectives

1. To introduce philosophy of 'Limit State Approach', for Design of Steel structures according to Bureau of Indian Standard Code of practice IS 800: 2007
2. To estimate magnitudes of various types loads on steel structures for strength and serviceability, and arrive at appropriate load combinations for steel structure design.
3. To learn design procedures of bolted & welded connections, tension members, compression members, column bases and roof trusses by Limit State Method.
4. To acquaint students, with the plastic analysis of beams and portal frames.

Course Outcomes

Upon successful completion of the course the students will be able to:

1. Select various load combinations acting on steel structure elements and choose appropriate ones for steel structure design.
2. Adopt and apply 'Limit State' design approach for designing various elements of steel structures for strength and serviceability.
3. Design various steel structure elements viz. Bolted and welded connections, Tension members Compression members, Column bases, Flexural members etc. as per procedures defined by Indian Standard Code of practice : IS 800: 2007(General Construction in Steel)
4. Analyze beams and portal frames by plastic analysis approach.

SECTION I

UNIT 1: Introduction to Design of Steel Structures (04)

a) Advantages and disadvantages of steel structures, permissible stresses, factor of safety, methods of design, types of connections, various types of standard rolled sections, types of loads and load combination.

b) Types of steel structures, grades of structural steel, relevant IS specifications such as IS: 800-2007, IS: 808-1989, IS: 875 part I to III, SP: 6(1), SP: 6(6), IS: 4000-1992, codes for welded connections.

UNIT 2: Introduction to Plastic Analysis for Beams and Portal Frames (08)

a) Plastic moment, moment curvature relationship, plastic hinges, yield spread in section, shape factor for cross-sections, theorem of plastic analysis, mechanisms, collapse load, complete, partial and over complete collapse, application of virtual work method to beams and portal frames.

b) Philosophy of limit state design for strength and serviceability, partial safety factor for load and resistance, various design load combinations, classification of cross section such as plastic, compact, semi-compact and slender.

UNIT 3: Tension Members (06)

Various cross sections such as solid threaded rod, cable and angle sections, net effective area of bar, angle, tees and flats, Limit strength due to yielding, rupture and block shear, Load carrying capacity, Design of tension member, connections of member with gusset plate by bolts and welds, Design of tension splice.

UNIT 4: Compression Members-Struts (05)

Common sections used in trusses, buckling classification as per geometry of cross section, buckling curves, effective length and slenderness ratio, permissible stresses, Load carrying capacity, design of struts, connections of members with gusset plate by bolts and welds.

SECTION II

UNIT 5: Beams (07)

Laterally supported and unsupported beams, design of simple beam, built up beams using flange plates, low and high shear, check for deflection, Curtailment of flange plates, web buckling and web crippling. Secondary and main beam arrangement for floor of building, design of beam to beam connections using bolt / weld.

UNIT 6: Roof Trusses (04)

Various component of an industrial shed, Types of trusses, load calculation and combination, design of purlins, design of members of a truss, Design of hinge and roller supports.

UNIT 7: Columns (06)

Simple and built up section; Design of built-up column, lacing and battening, connection of lacing/battening with main components by bolts and welds, column subjected to axial force and bending moment, column splices, design of eccentrically loaded column subjected to uniaxial bending (check for section strength only), design of beam to column connections using bolt / weld.

UNIT 8: Column Bases (05)

Column base under axial load: design of slab base, gusseted base, design of anchor bolts, design of pedestal, Column base for axial load and uniaxial bending.

Note:

Use of IS: 800-2007, IS 875, IS: Handbook No. 1 for steel section and steel table is permitted for theory examinations.

TERM WORK

Term work shall consist of at least eight assignments based on theoretical course above.

TEXT BOOKS

1) Design of Steel Structures, N. Subramanian, Oxford, 2008
2) Limit State Design of Steel Structures, S. K Duggal.
3) Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S. S, I K International Publishing House, New Delhi
4) Limit state design in Structural Steel by Dr M R Shiyekar

REFERENCE BOOKS

1) Limit state design of Steel Structure by V. L. Shah & Gore, Structures Publication, Pune
2) Limit State Design of Steel Structures by D. Ramchandra & Virendra Gehlot, Scientific Publishers
3) Design of Steel Structures by K. S. Sai Ram, published by Dorling Kindersley (India) Pvt. Ltd.
4) Teaching Resource Material by INSDAG
5) Bureau of Indian Standards, IS800-2007, IS875-1987.
6) Steel Tables.

T.E. (CIVIL ENGINEERING) PART- I
GEOTECHNICAL ENGINEERING –I

Teaching scheme:-

Lectures – 3 hours per week
Practical – 2 hours per week

Examination scheme: -

Theory Exam- 100 marks
Term work – 25 marks
Practical Oral Exam- 25marks

Course Objectives

1. To familiarize the students about terminology used in geotechnical engineering and to impart basic knowledge of the physical and mechanical characteristics of soils
2. To provide hands on experience of laboratory investigation of soil to find index properties and strength properties needed for geotechnical engineering design
3. To instruct the students about compaction and consolidation phenomenon and their importance in the field
4. To acquaint the students with various theories of earth pressure calculations on soil retaining structures.

Course Outcomes

By the end of this course, the student will be able to:

1. Carry out experiments on soil to calculate various indices and strength properties to understand behavior of soil
2. Apply basic hydraulic flow principles to soils, to calculate the seepage through earth structures and foundations.
3. Apply one dimensional consolidation theory to estimate time-dependent settlements of foundations.
4. Choose a suitable method for estimating earth pressure for a given situation.

SECTION –I

Unit 1: **(08)**

Introduction: - Definition of soil and soil engineering, Application areas of soil mechanics, 3- phase soil system.

Index properties of soil:- Terminology used in basic soil properties (Voids ratio, Porosity, Degree of saturation, Percentage air voids, air content, different densities & unit weights) and their inter relationship, Method for determination of field density viz. Sand Replacement and Core Cutter. Specific gravity and its determination methods, Density index.

Soil consistency:- Atterberg's limits and their significance.

Soil classification:- Soil classification based on particle size and consistency, Grain size distribution by mechanical & sedimentation analysis, I.S. classification system of soil, soil structure and fabric.

Unit 2: **(08)**

Flow of water through soil:- Permeability – head , gradient and potential , Darcy's law and its validity, Factors affecting permeability, Field and laboratory methods of determining permeability, seepage pressure, Quick sand condition, critical hydraulic gradient, Derivation of Laplace's equation, flow net and its application, Construction of flow net, Piping phenomenon, concept of total, neutral & inter granular stress.

Stress Distribution in Soil: Boussineq's Equation for point load, Vertical pressure under uniformly loaded circular area and uniformly loaded rectangular area, Pressure bulb and its significance, Newmarks's Chart.

Unit 3 : **(07)**

Shear strength :- Concept of shear, Coulmob's theory and failure envelope, Total stress approach, effective stress approach and pore water pressure, Representation of stresses on Mohr's circle for different types of soil such as cohesive and cohesion less in terms of total stress & effective stress, Peak and Residual shear strength, Application of shear strength parameters in the field.

Different types of shear tests:- Unconsolidated Undrained (U-U), Consolidated Undrained (C-U) and consolidated drained test (C-D). Choice of type of test, Box shear test, Triaxial compression test with pore pressures and volume change measurements, Unconfined compression test, Vane shear test, Sensitivity and thixotropy of cohesive soils, factors affecting shear strength.

SECTION –II

Unit 4: **(06)**

Compaction:- Theory of compaction, factors influencing compaction, compacted density. Laboratory Standard and Modified compaction test, Method and measurement of field compaction, field compaction control.

Unit 5: **(08)**

Compressibility and consolidation:

Compressibility:- Definition, compressibility of laterally confined soil, compression of sand and clay, e – p curve, e- log p curve, compression index

Consolidation:- Basic terminology , Terzaghi's theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation, degree of consolidation, relevance of one dimensional consolidation to field condition, time factor

Unit 6: **(08)**

Earth pressure theory:- Concepts, area of application, Earth pressure at rest, active and passive conditions. Rankines and Coulomb's theory of earth pressure, Graphical solution- Trial wedge method, Culman's method – Rehbhan's construction and modification. Critical depth of open cut in cohesive soil.

TERM WORK

Term work shall consist of at least eight of following experiments in the laboratory:

1. Specific gravity determination of coarse and fine gained soil
2. Particle size distribution- Mechanical sieve analysis, wet sieve analysis
3. Determination of Atterberg's consistency limits
4. Permeability- Determination of coefficient of permeability
5. Field density determination: Sand replacement & Core cutter method.
6. Proctor compaction test : Light & Heavy
7. Direct box shear test
8. Unconfined compression test
9. Triaxial test
10. Laboratory Vane Shear Test.
11 One dimensional consolidation test

TEXT BOOKS

1. Soil Mechanics and foundation Engineering- B.C. Punmia [Laxmi publications (Pvt) Ltd, New Delhi]
2. Geotechnical Engineering- Purushottam Raj [Tata Mcgraw hill company Ltd, New Delhi]
3. Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age, New Delhi. 1998)
4. Soil Mechanics and Foundation Engineering - Dr. K. R. Arora, [Standard Publication]
5. Soil Mechanics and Foundation Engineering -V.N.S. Murthy [UBS publishers and distributers, New Delhi]
6. Geotechnical Engineering- Kasamalkar B.J. [Pune Vidyarthi Griha Prakashan, Pune]
7. Geotechnical Engineering - C. Venkatachalam [New Age International (I) Ltd, New Delhi]
8. Principals of Geotechnical Engineering- Braja M. Das (Cengage Learning India Pvt Ltd, New Delhi)
9. SP36-1 Compendium of Indian Standards on Soil Engineering Part 1
10. SP36-2 Compendium of Indian Standards on Soil Engineering Part 2

REFERENCE BOOKS

1. Soil Mechanics in Engineering Practice - Terzaghi and Peck, John Wiley and sons, New York
2. Fundamentals of Soil mechanics - Taylor D.W, [John Wiley, New York]
3. Soil mechanics in theory and practice- Alam Singh [Asian Publishing House, Bombay]
4. Soil Testing -T.W. Lambe [Willey Eastern Limited, New Delhi]
5. Geotechnical Engineering by Shashi K. Gulati & Manoj Datta, Tata McGraw Hill

T.E. (CIVIL ENGINEERING) PART- I
BUILDING PLANNING & DESIGN

Teaching Scheme:

Lectures: 3 hours per week
Drawing: 4 hours per week

Examination Scheme

Theory paper: 100 marks
Term work: 25 marks
Oral Exam: 25 Marks

Course Objectives

1. To acquaint the students with of various types of public buildings and their functional requirements.
2. Study of principles of planning and design of public buildings with special reference to aesthetics, acoustics and fire fighting.
3. To emphasize the various aspects of the 'Green Building' design considerations and their adoption in public building planning.
4. To inculcate the knowledge and skills of preparing municipal building permission drawings for the public buildings.

Course Outcomes

1. The students will be able to plan and design a public building according to requirements adhering to appropriate norms and standards.
2. The students will be able to prepare 'Municipal drawing' for public buildings for obtaining building permission from competent authority.
3. The students will be able to incorporate Green Building Design principles while designing public buildings.
4. The students will be able prepare the building drawings by using suitable 'Computer Aided Drawing and Design' application software.

SECTION-I

Unit 1:- Dimension Relationships **(03)**

Dimensions & Space requirement in relation to body measurements. Space design for passage between walls, service access, stairs, ramps, elevators.

Unit 2:- Planning and Design of Public Buildings **(16)**

Planning and Design, Site Selection, site layout for various types of building such as:

a) Educational Building: Younger age range, Middle age range, older age range, School for mentally retarded.

b) Building for health – Sanatorium, Hospitals.

c) Assembly buildings - Recreation Hall, Community hall, Cinema theaters, Gymnasiums, Restaurant, Temples, Dance hall, Clubs.

d) Business and Mercantile building – Shops, banks, markets, & departmental stores

e) Industrial Buildings: Factories, Warehouses

f) Office and Other building: Post office, Administrative building etc.

g) Building for transportations – Bus Station, Truck Terminals

h) Computers centres, Service Centre for communication and electronic media

Unit 3:- Perspective **(04)**

Elements of perspective drawings, parallel perspective and angular perspective.

SECTION-II

Unit 4:- Green Buildings and Cad **(06)**

a) Computer aided design and drawing, Development of plan, Elevation and Section.

b) Concepts of Green Building and energy efficient buildings.

UNIT 5:- Acoustic Sound Insulation **(06)**

a) Acoustic- Sound Frequency, Intensity, sound decibel rating, absorption of sound-Various materials. Sabine's formula, optimum reverberation time, conditions for good acoustics, effect of reflectors, flat ceiling, design of an auditorium, defects in auditorium and remedies, acoustics of various buildings such as Auditorium hall, Classrooms, broadcasting room etc.

b) Sound insulation: Acceptable noise level – Noise prevention at its source, transmission of noise, Noise control- general Consideration.

UNIT 6:- Fire Resistant Structures **(05)**

Fire resistant Structures - Fire protection precautions, confining of fire, Fire hazards, characteristics of fire resistant material, various building material and resistance for fire, Fire resisting construction, fire load- Normal and abnormal, distribution of fire load, grading of structural elements and buildings, fire escapes.

UNIT 7:- Aesthetics **(05)**

a) The Nature of Architecture- Definition and Scope of the study.

b) The Aesthetic component of building, terms such as mass, space, proportion, Symmetry, balance, contract, pattern. Introduction to concept of Interior Designing and Landscaping.

TERM WORK

(For all drawing work use full size sheets)

(I) Planning Designing of building project for which min. 3 Sheets to be drawn as shown below.

(a) Permission Drawing- 2 Sheets

(b) Furniture layout and Drainage layout – 1 Sheet.

(c) Perspective drawing of the above building.

(II)

(a) Drawing a perspective view of two small objects, total 2 exercises-1 sheet.

(III) One dimensional line plan for each type of building from unit no.2 (a to h) on full size graph sheets – total 4

(IV) Report on building project under (I) above.

Oral examination shall be based on Term Work.

Question paper shall have section of 40 marks devoted to drawing.

TEXT BOOKS

1. Building Construction: Arora and Bindra, Dhanpat Rai Publications
2. Building Design and Drawing – Y.S.Sane, Allies Book Stall
3. Principles of Perspective drawing- Shah, Kale, Patki, Tata Mc Graw Hill Publication Ltd, Delhi
4. Building Construction by Sushil Kumar, Standard Publishers Distributors, Delhi
5. Interior Design- Principles and Practice- M. Pratap Rao, Standard Publishers and Dist., Delhi
6. Building Planning and Design by Kumar Swami and Kameshwarrao, Charotar Publishing House.
7. Civil Engg. Drawing- by M. Chakraborty, Published by M Chakraborty – Kolkata
8. Civil Engineering Drawing – by R.S.Malik, G.S.Meo, Computech Publication Ltd New Asian

REFERENCE BOOKS

1. Building Construction by Mckay, W. B. & Mckay, J. M. , Vol.III and IV, Donhead Publishing Limited
2. Modern Building Construction by Warland D. E., Vol.I and II, Pitman Publishing
3. Building Drawing – Shah, Kale, Patki, Tata McGraw-Hill Education
4. Built Environment by Shah, Kale, Patki, Tata McGraw-Hill Education

5. Construction science – by Edwin Walker, Selwyn Morgan, Hutchinson Educational
6. Time savers standards for buildings – Calendar Pub. McGraw Hill
7. Alternative Building Materials & Technology-by Jagdish ,Reddy, Rao Published by New Age International, New Delhi
8. Nuclear Reactor Materials by C. Smith, Addison- Wesley Pub.
9. Art in everyday life by Goldstein, Oxford Pub.
10. Planning by E and OE – Pub. London Illiffe and Sons Ltd.
11. Inside Outside- Magazine issues.
12. Maintenance of Building- by A.C. Panchdhari, Published by New Age International, New Delhi.
13. Materials for Nuclear Power Reactors- by Hausner, Henry H. And Roboff, Stanley B., Reinhold Publishing Corp
14. Environment and services-by Peter Burberry, Mitchells Building Series
15. Development Control Rules- Building Byelaws of Local Authority.

T.E. (CIVIL ENGINEERING) PART- I
ENVIRONMENTAL ENGINEERING –I

Teaching Scheme

Lectures: 3 hours per week
Practical: 2 hours per week

Examination Scheme

Theory papers: 100 Marks
Term Work: 25 Marks

Course Objectives

1. To acquaint the students with drinking water quality standards and forecast water demands.
2. Study of various units of water treatment plants, treatment procedures and sequencing of water treatment units for various sources of water.
3. To prepare the students to carry out design of water distribution systems and appurtenances using appropriate methods.
4. To acquaint the students with various plumbing systems, and their operation and maintenance.

Course Outcomes

Upon successful completion of course the student will be able to:

1. Plan and design water supply systems for a rural/urban area based on population forecasts.
2. Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
3. Apply knowledge of advanced water treatment processes for individual water purification units.
4. Design and supervise building plumbing systems and their maintenance.

SECTION I

Unit 1: Quantity and Quality of Water **(06)**

Sources of water, Quality & Quantity of water sources, Intake work, Demand of water, factors affecting demand, Fluctuation in water demand and its effect, Design period, Population forecast.

Water quality parameters, characteristics and their significance, Drinking water quality standards.

Unit 2: Water Treatment processes **(16)**

a) Concepts of water treatment, Sequencing of treatment units for various qualities of surface and ground water, Aeration, Coagulation, Types of Coagulant, dosing, rapid mixing, Flocculation.

   Solid separation theory, Types of Sedimentation tanks and design, Tube and plate settler, Design of clariflocculator,

   Theory of filtration, Slow sand, Rapid sand, Dual multimedia Roughing and pressure filters-Operation and design.

   Disinfection techniques- Ozonation, u/v radiation, Chemistry of chlorination, chlorine demand curve. Types of chlorination, Application of Chlorine.

b) Water softening Processes, Chemical Precipitation, Ion Exchange, Reduction of dissolved salt. Introduction to Membrane, Carbon filtration, Adsorption process.

   Salient features of rural water supply scheme. The package water treatment plant.

SECTION II

Unit 3: Conveyance of Water **(06)**

Transmission of water, pumping and gravity mains, choice of pipe materials, forces acting on pressure pipes, economic size of conveying main, O& M of conveyance system, thrust block design. Types of Corrosion and control measures.

Unit 4: Distribution of Water **(09)**

Water distribution systems, method of distributing water, system configuration, appurtenances, basic system requirements, hydraulic analysis head balance method, quantity balance method, equivalent pipe concept, Newton – Raphson and linear theory methods

Unit 5: Maintenance of Distribution System **(08)**

a. Maintenance of water distribution systems, leak detection, concept of water quality, variations in distribution systems.
   Distribution reservoir, service storage, necessity, location, and Design (head and capacity) requirements.

b. Water supply and plumbing in buildings
   Scope of computer applications in Environmental Engg.

TERM WORK

The term work includes practical work to find the characteristics of water and assignments on each unit operations

(A) Experiments for the determination of the following (Min. 10)

1 p^H value
2 Alkalinity
3 Acidity
4 Chloride content
5 Hardness
6 Turbidity
7 Residual Chlorine
8 Total Dissolved Solids through measurement of conductivity
9 Solids – Total, Suspended, dissolved, volatile and fixed
10 Dissolved Oxygen

11 Most Probable Number

12 Optimum dose of alum by jar test

13 Fluorides

14 Nitrogen

15 Irons and Manganese

(B) Design /Analysis Problems on each water treatment unit and distribution system.

(C)Visit to water treatment plant

Term work submission shall consist of journals containing

1. Above mentioned Experiments
2. Visit report describing the water treatment units of the plants visited.
3. Design problems mentioned in B

TEXT BOOKS

1.Environmental Engineering by Peavey, H.S.Rowe, D.R. and Tchobanoglous McGraw Hill Book Company.

2.Water Supply and Pollution Control by Viessman W.and Hammer M.J. Harper Collins College Publishers.

3.Water and Waste Water Technology by Hammer M.J. Prentice-Hall of India Private ltd.

4.Water and Wastewater Technology by G.S. Birdie and J.S. Birdie

5.Water Supply by Duggal K.N. ,S. Chand and Company.

6.Water Supply by Garg S.K., Khanna Publishers.

7.Water Supply and Waste water Disposal by Fair and Gayes, John Wiley Publication.

8.Water Supply Engineering by B.C.Punmia,Ashok Jain,Arun Jain, Laxmi Publications

REFERENCE BOOKS

1.Manual on Water Supply and Treatment- Government of India Publication.-1993

2."Water and Waste Water Engineering Vol. I & II", John Wiley Publication, 1966. Fair G. M, Geyer J. C, and Okun D. A

3."Water and Waste Water Technology", Prentice Hall of India Private Limited, 1996. Hammer M. J.

T.E. (CIVIL ENGINEERING) PART- I

ENGINEERING MANAGEMENT – I

Teaching Scheme:

Lectures: 3 Hours /Week

Examination Scheme:

Theory Paper: 100 Marks
Term work: 25 Marks

Course Objectives

1. Study of the various principles of engineering management.
2. Learning various optimization techniques and adopting appropriate technique for decision making.
3. Understand the principles of Inventory management.
4. Learn to recognize and apply quality assurance and quality control techniques for Construction Management.

Course Outcomes

At the end of the course, a student will be able to:

1. Lead a team, as well as work as a member of a team, for effective management of construction projects.
2. Apply the various Optimization techniques for decision making in construction industry.
3. Successfully manage the inventory of a project or industry.
4. Assess and assure about quality of materials and workmanship, in Civil Engineering projects.
5. Prepare suitable disaster management plan and implement it effectively to mitigate the disaster.

SECTION – I

Unit (1) **(04)**

Definition and Evolution of Management (Introduction only)

Functions of Management

Planning: Process of planning, Types, policies and strategies, Management by objectives. Formal and informal organization, centralization, decentralization, line, line and staff, functional organization. Leading, directing, controlling and coordination. Communication process, motivation.

Unit (2) **(09)**

Introduction to Optimization Techniques: Single variable optimization, standard form, necessary and sufficient condition.

Importance of Decision Making, steps in decision making.

Decision under certainty: Linear Programming, Formulation of simple L-P model, Graphical method, Simplex method, Duality.

Application of Linear Programming in 'Transportation Problems': North-West corner method, Least cost method, Vogel's Approximation method (Only Initial Basic Feasible Solution) and Application of Linear Programming in 'Assignment problems'.

Unit (3) **(04)**

Decision under uncertainty: Wald's, Savage, Hurvicz and Laplace criterion of optimism and regret, expected monitory value, Theory of games (dominance pure and mixed strategy).

Decision under risk: Decision tree.

Unit (4) **(04)**

Queuing or waiting line theory: Applications, Characteristics, Waiting Time and Idle Time costs, Single channel Queuing Problems for calculating average number of customers and average time in system and queue.

Monte Carlo Simulation: Concept, procedure and advantages.

Unit (5) **(02)**

Introduction to Dynamic Programming: Need and characteristics, stage and state, process of dynamic programming.

Introduction to emerging optimization techniques: Artificial Neural Networks, Fuzzy Logic, Genetic Algorithms (Only concept of each technique).

SECTION – II

Unit (6) **(07)**

Material Management

Purchasing principles, stores: Coding system, function, responsibilities, record and accounting, significance of material management to project management.

Inventory control

Introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks.

Unit (7) **(07)**

Linear break even analysis: Problems

Quality control: Concept, Statistical Methods, Control charts (X, R, p, c charts)

Total Quality Management – Philosophy of Juran, Deming, importance.

Quality Circle – Implementation steps.

Unit (8) **(08)**

Disaster Management: Disaster: Definition, Types (Explanation with suitable case study)

Pre- disaster stage: Preparedness- Preparing hazard zone maps, Predictability/ forecasting and warning, Preparing disaster preparedness plan, Land use zoning, Preparedness through Information, Education and Communication (IEC).

Mitigation: Population reduction in vulnerable areas, Awareness emergency stage, Rescue training for search and operation at national and regional level, Immediate relief, Assessment surveys

Post- Disaster stage: Rehabilitation, Political and administrative aspect, Social aspect, Economic aspect- Environmental Aspect.

TERM WORK

Term work assessment shall be a continuous process based on the

1. Assignments, class tests, quizzes, attendance and interaction during theory, and report presentation etc., as applicable.
2. A field visit report covering Quality aspects in Civil engineering
3. A case study of Disaster management

   The students will submit the record of term work in Journal/workbook.

TEXT BOOKS

1 A Text book of Principles of Management and Personnel Management, A. S. Deshpande, Vora Publications, New Delhi, 1987.

2 Principles of Management, Tripathi P. C., P N Reddy, Tata McGraw Hill International, New Delhi, 4th Ed. 2011.

3 Operation Research, Hamdy A. Taha, Prentice Hall of India, New Delhi, 8th Ed.2011

4 Store Management, Menon K. S., McMillan Co. New Delhi, 2nd Ed. 1998.

5 Fundamentals of TQM –Dahlgaard J.J., Kai Kristesen, Gopal K. Kanji, Eswar Press, First Indian Reprint 2004.

6 Statistical Quality Control- E. L. Grant , Wiley International Education, 6th Ed.

7 Disaster management, Ayaz Ahmad, Anmol Publication Pvt. Ltd., 1st Ed.2003

8 Disasters, Brig. B. K. Khanna, NIPA, July 2005.

REFERENCE BOOKS

1 Management: Stoner J.A.F, Freeman R. E., Gilbert D. R., Prentice Hall of India, New Delhi, 4th Ed 2008.

2 Essentials of Management: Koontz Z. H., Weihrich H, Tata McGraw Hill Publications , 2000.

3 Principles of Operation Research: Wagner H. M., Prentice Hall of India, 2nd Ed.1925.

4 Optimization: Theory and Applications, Rao S.S. ,Wiley Eastern Ltd., 3rd Ed. 2007.

5 Operation Research: Richard Bronson Govindsami N., Shaum's outline series, Tata McGraw Hill , 2nd Ed.2004

6 Material Management: Gopal Krishnan, Sudeshan.

7 Handbook of Quality Control- Juran J. M., A. B. Godfrey, Mc Graw- Hill International, 5th Ed.

8 Disaster Mitigation, Preparedness, Recovery and Response: P. C. Sinha, SBS Publishers & Distributors Pvt. Ltd.

9 Manuals on Natural Disaster management in India, M.C. Gupta, National Centre for Disaster Management, IIPA, New Delhi, 2001.

T.E. (CIVIL ENGINEERING) PART-I
TRANSPORTATION ENGINEERING I

Teaching Scheme:

Lectures: 3 hours per week
Practical: 2 Hours per week

Examination Scheme:

Theory paper: 100 marks
Term work: 25 Marks

Course Objectives

1. Study of the various principles of highway planning, design of flexible and rigid pavements, traffic engineering, traffic safety analysis
2. Familiarising the students with desirable properties and testing procedures of highway construction materials as per BIS and Indian Roads Congress (IRC) standards.
3. To learn types of pavements, components and functions of pavements, types of highway vehicles and aircrafts, IRC loadings, equivalent axle loading and load factors, Flexible and Rigid pavement design methods, etc.
4 To introduce the students to various types of bridges, bridge components, and design aspects of bridges.
5. To know about tunnelling methods in various types of soils.

Course Outcomes

1. The students will be able to carry out geometric design and pavement design of roads for particular nature and intensity of traffic as per IRC standards.
2. The student will be able carry out testing various road construction materials in Laboratory using modern equipments & instruments and draw appropriate conclusions regarding their usability.
3. The student will be able to undertake traffic studies and adopt appropriate traffic signals.
4. The student will be able to design various bridge components.
5. The students will be able to select appropriate shape of tunnel and adopt proper tunnelling method of tunnel construction.

SECTION- I

Unit: 1 **(07)**

Introduction to Transportation engineering: Modes of transportations, their importance and limitations, the importance of highway transportation.

Highway Development and Planning: Principles of Highway planning, Road development in India, Classification of roads, road network patterns, Planning Surveys.

Highway Alignment: Requirements, Engineering Surveys.

Unit: 2 **(07)**

Highway Geometric Design: Cross Section elements, carriageways, camber, stoppingand overtaking sight distances, Sight distance at uncontrolled intersection Horizontal alignment-Curves, design of super elevation, extra widening, transition curves, vertical curves.

Unit: 3 **(06)**

Traffic Engineering: Fundamentals of traffic flow, Road User and Vehicular characteristics.

Traffic Studies: Volume studies, speed studies, parking studies, origin-destination studies and accident studies.

Traffic management and Safety: Traffic control devices, channelization, traffic signal, junctions, intelligent transportation system, Design of Rotary Intersection and traffic Signal.

Unit: 4 **(04)**

Highway Materials: Properties of sub grade and pavement component materials, Tests on subgrade soils (CBR and Plate load tests), aggregates and bituminous materials, bituminous mix design. Application of Geosynthetics in road construction.

SECTION- II

Unit: 5 **(08)**

Pavement Design**:** Types of pavements, Design parameters, Axle and Wheel load, tyre pressure, ESWL concept, Group Index method, CBR method and IRC method of flexible pavement design. Analysis of wheel load and temperature stresses of rigid pavement, joints, Design of Rigid Pavement as per IRC.

Unit: 6 **(03)**

Highway drainage: Surface and sub-surface drainage.

Highway Construction and Maintenance: Earthen/Gravel road, Water Bound Macadam, WetMix macadam, Bituminous concrete pavement, Cement Concrete pavement. Pavement failures, Pavement evaluation, Maintenance and strengthening measures.

Unit: 7 **(06)**

Bridge Engineering: components of bridge, Classification and site selection.

Bridge hydrology: Flood discharge, waterways, afflux, scour depth, economic span.

IRC classification of Loads, Forces, Stresses: IRC Specification and code of practices, Critical combinations.

Bridge Sub-Structure: Types of foundations and their choice, Open, Pile and well foundation, Pneumatic Caissons, cofferdams, Abutment, Piers and Wing walls.

Super Structure: Different structural forms, Bridge Bearings.

Unit: 8 Tunnel Engineering **(04)**

Introduction to tunnelling, size and shape of tunnel and suitability, tunnelling through soils, soft and hard rocks, tunnel lining, drainage and ventilation.

TERM WORK

1. CBR test on soil
2. Impact test on aggregate
3. Crushing strength test on aggregate
4. Abrasion Test on aggregate
5. Soundness test on aggregate
6. Shape test on aggregate
7. Specific gravity test on bitumen
8. Penetration test on bitumen
9. Flash and Fire point test on bitumen
10. Ductility test on bitumen
11. Softening Point test on bitumen
12. Viscosity test on Tar
13. Marshall Stability Test on bitumen mix

From the above tests, **Minimum 8 Tests has to be performed.**

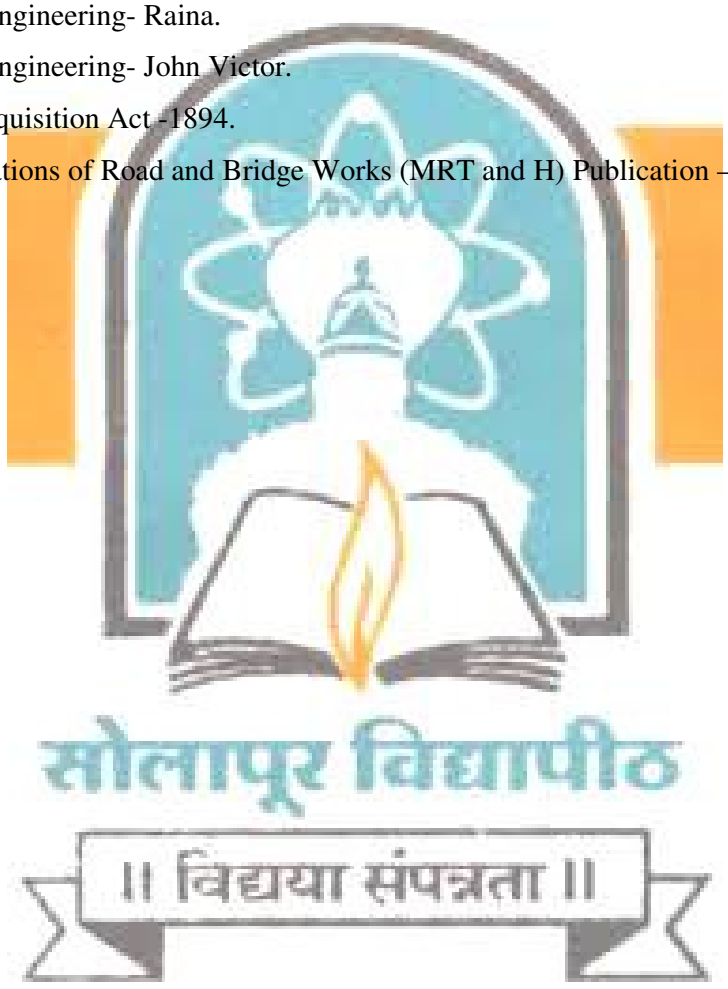
Assignments based on syllabus.

TEXT BOOKS

1. Highway Engineering By S.K.Khanna and C.E.G.Justo, *NemchandBross. Roorkee.*
2. Traffic and transport planning, By L.R.Kadiyali, *Khanna publisher, New Delhi.*
3. Principles and Practices of Bridge Engineering, By S. P. Bindra, *Dhanapat Rai Publications.*
4.Harbour, Dock and Tunnel engineering by R. Shrinivassan, *Charotar Publishing House.*

REFERENCE BOOKS

1. Principles of Transportation Engineering, By Chakrobortyand Das, *PHI Publication*.
2. Transportation Engineering – An Introduction, by Khistry, C.J, *PHI Publication*.
3. Bridge Engineering- Ponnuswami. S, *Tata McGraw Hill publications.*
4. Bridge Engineering- Raina.
5. Bridge Engineering- John Victor.
6. Land Acquisition Act -1894.
7. Specifications of Road and Bridge Works (MRT and H) Publication –IRC, New Delhi.



T.E. (CIVIL ENGINEERING) PART II

STRUCTURAL MECHANICS III

Teaching Schemes:

Lectures : 4 Hours per week
Practical : 2 Hours per week

Examination Schemes:

Theory Paper: 100 Marks
Term Work : 25 Marks

Course Objectives

1. The study of 'Force' and 'displacement' methods of analysis of statically indeterminate structures.
2. To illustrate the various methods by which students can analyze the structures for likely deformations and deflections for various load combinations.
3. To familiarize the students with the matrix methods of structural analysis.
4. To provide hands on experience to the students on application softwares for structural analysis.

Course Outcomes

Upon successful completion of the course, the students should be able to:

1. Discretize simple structures, identify static and kinematic degrees of freedom
2. Solve the problems of analysis of beams, trusses and frames for joint displacements, and forces in members, by force method and displacement method.
3. Analyze the structures by energy methods using Castigliano's theorem
4. Select and use appropriate application software for structural analysis.

SECTION I

FORCE METHODS

UNIT 1: INTRODUCTION **(04)**

Concept of Indeterminate structures, Degree of Static and Kinematic indeterminacy, Degrees of freedom for various types of structures, Methods of analysis and comparison of force and displacement methods.

UNIT 2: METHOD OF CONSISTENT DEFORMATIONS **(08)**

Propped cantilevers, Fixed beams, Continuous beams (Degree of Static Indeterminacy DSI ≤ 2), Yielding of supports.

UNIT 3: ENERGY METHODS **(10)**

Strain Energy due to various forces, Castigliano's theorem and Unit Load method, Betti's Law, Maxwell's reciprocal theorem, Two hinged arches, Indeterminate beams & rigid jointed Frames(DSI ≤ 2).

UNIT 4: FLEXIBILITY METHOD **(08)**

Derivation of flexibility equation, flexibility coefficients, Development of flexibility matrix, Analysis of beams and portals (DSI ≤ 3).

SECTION II

DISPLACEMENT METHODS

UNIT 5: MOMENT DISTRIBUTION METHOD **(08)**

Concept of stiffness of a member, Relative stiffness, Distribution factors, concept of moment distribution, Application to beams, portal frames with and without sway, Symmetry and

antisymmetry, Sinking of supports, Shortcut moment distribution method.

UNIT 6: STIFFNESS METHOD FOR BEAMS (08)

Concept of stiffness, linearly elastic structures, derivation of Stiffness equation, Stiffness Coefficients, Development of stiffness matrix, Analysis of beams (Degree of K.I. ≤ 3), Sinking of supports.

UNIT 7: STIFFNESS METHOD FOR FRAMES (07)

Analysis of Portal frame and Trusses (Degree of K.I. ≤ 3).

UNIT 8: I.L.D. FOR INDETERMINANT STRUCTURES (07)

I.L.D for Beams (Degree of Static Indeterminacy (DSI ≤2) by using Mullers Bresauls Principle.

TERM WORK

1) It shall consist of assignments based on above topics.
2) Results of few assignments to be verified by using software.

TEXT BOOKS

1.Mechanics of Structures (Vol. II) -S.B. Junnarkar, Charator Book Publishing House.
2.Structural Analysis- Negi and Jangid, Tata McGraw-Hill Publishing Company Ltd.,New Delhi
3. Analysis of Structures (Vol. II) - Vazirani and Ratwani, Khanna Pub., Delhi
4. Structural Analysis- Matrix Approach- Pandit & Gupta, Tata McGraw-Hill Publishing Company Ltd., New Delhi

REFERENCE BOOKS

1. Matrix Analysis of Structures- Gere and Weaver, CBS Publishers, New Delhi
2. Indeterminate Structural Analysis-C. K. Wang, Tata McGraw-Hill Publishing Company Ltd., New Delhi
3. Theory of Structures- Timoshenko & Young, Tata McGraw-Hill Publishing
4. Structural Analysis-Sixth Ed.,-R.C.Hibbeler-Dorling Kindersley (India) Pvt. Ltd., Pearson Education, New Delhi.

T.E.CIVIL ENGINEERING PART II
GEOTECHNICAL ENGINEERING –II

Teaching scheme:-

Lectures – 4 Hours per week
Practical – 2 Hours per week

Examination scheme -

Theory Exam- 100 marks
Term work – 25 marks

Course Objectives

1. To familiarize the students with various methods of exploration using field and laboratory tests for soils and rocks to estimate bearing capacity founding strata.
2. Study of various theories of bearing capacity estimation of founding soil, and likely settlement beneath the foundation
3. Learning design procedures for shallow and deep foundations with their advantages and limitations, depending upon loading and field conditions.
4. To provide knowledge and practice of various methods of slope stability analysis of natural and artificial slopes

Course Outcomes

By the end of this course, the student should be able to:

1. Perform various field tests such as plate load test, standard penetration test and to interpret the data of field tests for the evaluation of bearing capacity.
2. Perform geotechnical design of different types of foundations such as isolated footing, combined footing, raft foundation etc.
3. Select and apply suitable ground improvement techniques such as vibroflotation, grouting, and soil reinforcement for given field and loading condition.
4. Apply the knowledge of various slope stability theories for the design of embankments.

SECTION –I

Unit 1: **(08)**

Introduction: - General requirements for satisfactory performance of foundations.

Soil Exploration:- Necessity, Planning, Exploration methods, Different types of boring- Hand and continuous flight augers, Wash boring, Rotary drilling. Soil sampling- Disturbed and Undisturbed. Rock drilling and sampling. Core barrels, Core boxes, Core recovery, RQD

Unit 2: **(14)**

Bearing Capacity Analysis: Bearing capacity – Ultimate, safe and allowable. Modes of failure, Terzaghi's bearing capacity equation with derivation, I S code method of bearing capacity (IS 6403 -1981), Effect of water table, Eccentricity of load.

Field Test for Bearing Capacity Evaluation: - Plate load test, Standard Penetration test and Pressure meter test. Test procedures and limitations.

Foundation Settlement: - Immediate settlement – computations as per IS 8009 – 1976 (part–I) approach and from plate load test observations. Consolidation settlement, Total settlement, Differential settlement, Tolerable settlement, Angular distortion

Unit 3: Foundation Construction in Difficult Soil **(08)**

Guide lines and care to be exercised in weak and compressible soil, Expansive soil, Collapsible soil, Corrosive soils

Ground Improvement Techniques:- Pre compression, Sand drains, Vibrofloatation, Grouting, Soil reinforcement

Geotextiles and its applications: - Geotextiles- Definition and Types, Functions of Geotextiles, Different applications in Civil Engineering (Roads, Railways, Embankments, Earth Retainment, Erosion control etc)

SECTION –II

Unit 4: **(06)**

Shallow foundations: - Design of Isolated, Combined, Strap footing (Rigid analysis), Raft foundations (Conventional method), Floating foundations (RCC design is not expected)

Unit 5: Deep foundations:- **(10)**

a) Pile foundation: Classification, Single pile capacity for RCC cast in situ pile in Cohesive, Non cohesive and mixed soils by Static method, Dynamic formulae, Negative skin friction. Under reamed piles- equipment, construction and precautions. Load carrying capacity of pile group, Group action of piles- Spacing of piles in a group, group efficiency- empirical formulae.

b) Caisson Foundations: Box, Pneumatic, open (well) caissons, Shapes of well, components. Forces on caisson, grip length, well sinking, practical difficulties and remedial measures

Unit 6:- **(08)**

Cofferdams: Various Types, Cell fill material, Stability of cellular cofferdam.

Sheet Piles: Classifications, Design of cantilever sheet pile in cohesion less (approximate method) and cohesive soils. Design of anchored sheet pile by free earth support method

Unit 7: **(06)**

Slope Stability:- Stability of finite slopes- slip circle method, Semi graphical and graphical methods- Swedish slip circle method, Method of slices, Friction circle method. Fellinius construction to locate critical slip center, Stability No and it's use.

TERM WORK

The term work shall consist Laboratory work, Field work and Assignments on above topics

A) Field tests:-

1. Standard penetration test
2. Plate Load test
3. Vane shear test

B) Visit to foundation construction sites and preparation of report.

C) Laboratory work:-

1. Swelling pressure test

D) Assignments consisting design problems on:-

1. Bearing capacity calculation by various methods
2. Settlement calculations
3. Design of shallow foundation - Isolated, Combined, Raft using conventional method.
4. Pile and Pile group - Load carrying capacity of piles, Design of pile group
5. Sheet piles - Cantilever, Anchored using Free earth support method
6. Stability analysis – Slip circle, slice method, Fellinius construction, Taylor's Stability No.

TEXT BOOKS

1. Soil Mechanics and foundation Engineering -B.C. Punmia (Laxmi publications Pvt. Ltd, New Delhi)
2. Geotechnical Engineering- Purushottam Raj (Tata Mcgraw hill company Ltd, New Delhi)
3. Principals of Foundation Engineering – Braja M. Das (Cengage Learning India Pvt. Ltd, New Delhi)
4. Geotechnical Engineering - C. Venkatachalam (New Age International (I) Ltd, New Delhi)
5. Soil mechanics and foundation engineering- V.N.S. Murthy (UBS publisher's and distributers, New Delhi)
6. Foundation Design Manual- Dr. N.V. Nayak (Dhanpat Rai and Sons)
7. Foundation Engineering- Kasamalkar B.J. (Pune Vidyarthi Griha, Pune)

8. SP36-1 Compendium of Indian Standards on Soil Engineering Part 1
9. SP36-2 Compendium of Indian Standards on Soil Engineering Part 2
10. Design of sub structure- Swami Saran (Oxford and IBH Publications)

REFERENCE BOOKS

1. Foundation analysis and design- Bowles J. E. (Tata McGraw hill company Ltd New Delhi)
2. Foundation design and construction- Tomlinson (M.J. English Language Book Society, Essex)
3. Foundation Design- Teng W.C
4. Soil mechanics in theory and practice- Alam Singh, (Asian Publishing House, Bombay)

T.E. (CIVIL ENGINEERING) PART II
ENVIRONMENTAL ENGINEERING –II

Teaching Scheme

Lectures: 3 Hours per week
Practical: 2 Hours per week

Examination Scheme

Theory papers: 100 Marks
Term Work: 25 Marks
Oral Examination: 25 Marks

Course Objectives

1. To acquaint the students with the characterization of municipal waste, as well as sewage collection & conveyance systems.
2. Study of Primary and Secondary treatment methods of sewage, and concept of recycling the wastewater.
3. Familiarize the students with stream pollution due to waste disposal and suitable centralized/decentralized wastewater Treatment system
4. Learning solid waste and hazardous waste management systems for urban areas.
5. Understanding various sources of air pollution, its measurement and control.

Course Outcomes

Upon successful completion of course the student should be able to:

1. Plan the layout of sewage collection system, matching the topography of the region and characterisation of sewage.
2. Decide sequence and design of wastewater treatment units to meet the sewage treatment standards.
3. Design the wastewater treatment plant using Trickling filter, anaerobic treatment and low cost treatment methods
4. Adopt appropriate methods of Solid waste Disposal and Management of hazardous waste.
5. Measure air pollution and adopt control measures to control of industrial air pollution.

SECTION-I

Unit -1: Collection and conveyance of Sewage **(08)**

Components of wastewater flows, waste water sources and flow rate. Variation in flow rates, waste water constituents, Characteristics of municipal waste water, Quantity of storm water, Ground water infiltration.

Sewerage system, layout, types of sewers, collection system. Appurtenances Design of sanitary and storm water sewers, Maintenance of sewerage systems.

Sewage and sludge pumping, location, capacity and types of pumps, pumping station design.

Unit-2: Unit Operations **(10)**

Primary treatment - screening, comminuting, grit removal, oil and grease trap, chemical precipitation.

Secondary treatment – Activated sludge process, Process design and operating parameters, modification of ASP , operational problems .Trickling filter , classification , process design considerations . Secondary Clarifications.

Unit -3: Anaerobic treatment and Low cost treatment **(06)**

Fundamentals of anaerobic treatment, sludge characteristics, Treatment and disposal, Concept of different anaerobic reactors.

Low cost waste water treatment methods- Principle of waste stabilization pond.

Design and operation of oxidation pond, aerobic and anaerobic lagoons, Aerated lagoon, Oxidation ditch, septic tank.

Selection of alternative treatment process flow sheets. Concept of recycling of wastewater (gray water and brown water.)

SECTION-II

Unit-4: Disposal of waste water **(08)**

a) Disposal of waste water stream pollution, Self purification, DO sag curve, Streeter Phelp's Equation.

b) Emerging Technology for wastewater Treatment- Centralized Sewage Treatment System, objectives of small & decentralized wastewater Treatment system

Unit -5: Solid Waste Disposal **(06)**

Solid waste management – Solid waste definition, Types, sources, characteristics. Functional outlines- storage, collection, processing techniques,
Methods of treatments of solid waste-Composting, Incineration, Pyrolysis and sanitary land filling. Concept of hazardous waste management.

Unit -6: Air Pollution **(07)**

Air Pollution- Definition, Sources and classification of pollutants, Effects. Introduction to meteorological aspects of control of industrial air pollution- Settling Chamber, Bag filter, Cyclone separator, Scrubbers, Electrostatic precipitators. Control of vehicular air pollution. Air quality standards

TERM WORK

The term work includes practical work to find the characteristics of wastewater and demonstration of Air monitoring equipments and design of sewage treatment plant

Term work shall consist of the following:-

(A) List of Experiments (Analysis of Waste Water)

1. pH Value.
2. Total Solids

3. Biochemical Oxygen Demand
4. Chemical Oxygen Demand
5. Chlorides
6. Oil & Grease
7. Sulphate Content
8. Total Nitrogen
9. Demonstration of High Volume Sampler
10. Demonstration of Auto Exhaust Analyzer.

(B) Design of sewerage system & Treatment system for a small urban area.

(C) Visit to sewage treatment plant

Term work submission shall consist of the following –

1. Journal containing experiments carried out in part A of the term work and visit Report on C
2. Detail design and appropriate drawings required for part B of the term work.

TEXT BOOKS

1. Environmental Engineering by Peavey- H. S. Rowe, D.R. and Thobanoglous, [McGraw – Hill Book Company]
2. Water supply and pollution control - Viessman W. and Hammer M.J. [Harper Collins College Publishers.]
3. Waste Water Engineering Treatment & Disposal - Mertcalf & Eddy, [Tata McGraw Hill, 1982]
4. Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
5. Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
6. Waste water Supply Engineering by B. C. Punmia
7. Solid Waste Management in Developing countries - Bhide A.D. and Sundersen B.B. [Indian National Scientific Documentation Centre, New Delhi]
8. Air Pollution- Rao M.N. and Rao H.V.N. [Tata Mcgraw Hill, 1990]

REFERENCE BOOKS

1.Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97,Ministry of Urban development

2.Water and waste water Technology - Hammer M.J, [Prentice-Hall of India Private ltd.]

3.Masters. G.M. Introduction to Environmental Engineering and Science

4.Manual on Municipal Solid Waste Management- Ministry of Urban Development Govt. of India.

T.E. (CIVIL ENGINEERING) PART-II

ENGINEERING MANAGEMENT – II

Teaching Scheme:

Lectures: 4 hours per week
Practicals: 2 hours per week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 marks

Course objectives

1. To study various activities and their relationship with resources such as time, money, material, machine and manpower.
2. Apply various tools for project scheduling such as Bar Chart, CPM and PERT Networks to plan, track, update and optimize the resources.
3. To appraise alternative investment proposals, concept of Life Cycle Cost and Value Engineering.
4. To provide hands on experience on project management application software's for civil engineering projects.

Course outcomes

At the end of this course the students will be able to

1. Plan the project and prepare Bar chart and Network to optimize the project duration and cost.
2. Update the network and reevaluate the resources.
3. Demonstrate the decision making abilities based on economics in projects and to appraise alternative projects.
4. Analyze life cycle cost and value of the project.
5. Use appropriate project management application software for planning, tracking and reporting progress of civil engineering projects.

SECTION I

Unit 1 **(08)**

Project Management: Introduction, Steps in Project Management, work break down structure. Bar Chart, Mile stone chart.

Development of network: Representation by Activity on Arrow (AOA) and Activity on Node (AON), Fulkerson's Rule.

Critical Path Method (CPM): Introduction, Time estimates, floats, critical path.

Unit 2 **(08)**

Network compression: - Least Cost and Optimum Duration.

Resource allocation: Smoothening and leveling.

Updating: Need, steps, project duration, and calculation for updated network.

Unit 3 **(08)**

Performance Evaluation and Review Techniques (PERT)

Concept of probability, Normal and Beta Distribution, Central limit theorem. Time estimates and calculations of project duration, critical path, slack, probability of project completion.

Precedence Network (only concept)

Unit 4 **(06)**

Project Management Software (PMS): Introduction to applications of PMS (such as MS Excel, MS Project, Primavera, and PRINCE) and Open Source software. Reports generated by the software and its interpretation.

Management Information system: Role of information in decision making, Information system planning, Design and implementation, Evaluation and effectiveness of MIS.

SECTION – II

Unit 5 **(10)**

Engineering economics: Importance, demand and supply, types of costs, Interest-Simple, compound, continuous, and effective interest. Value of money - time and equivalence, tangible and intangible factors, Introduction to inflation. Cash flow diagram.
Interest factors – Uniform series factors, derivations.

Unit 6 **(10)**

Economic comparisons: Discontinuing methods- Present Worth method, equivalent annual cost method, capitalized cost method, Net Present Value, Internal Rate of Return and Benefit Cost ratio. Non discontinuing criteria: Payback and urgency criteria.

Unit 7 **(06)**

Life cycle costing: Definition, purpose and implications, economic principles for life cycle costing, types of life cycle costs. Economic considerations: Build Operate and Transfer (BOT) contracts and toll collection.

Unit 8 **(04)**

Value Engineering: Definitions: Value, value engineering, value analysis, value management, habits, roadblocks and attitudes and their relation to value engineering

TERM WORK

1 At least two exercises on each unit except unit no.4, 7 and 8.
2 Civil Engg. Problems on Bar chart, CPM, PERT, Precedence, engineering economics to be solved preferably using relevant software. Reports to be attached in the term work.

3 Visit report covering project management.

4 A case study of

   a. project management software reports and its interpretation – Status report, Risk report, Executive report and Resource report
   b. Life cycle costing
   c. Value engineering

TEXT BOOKS

1 A Management Guide to PERT/CPM: Weist J. D. ,Levy, Prentice Hall of India, New Delhi, 2nd Ed. 1982

2 PERT and CPM Principles and Applications: Srinath L. S., East West Publication, New Delhi, 3rd Ed. 1995.

3 PERT and CPM- B. C. Punmia, K. K. Khandelwal, Laxmi Publications, New Delhi, 4th Ed. 2012.

4 Computerized Project Management Technique for Manufacturing and Construction: Samaras T.T., Kim Yensueng, Prentice Hall of India, New Delhi, 1979.

5 Principles of Construction Management: Roy Pilcher , Tata McGraw Hill Publications.

6 Principles of Engineering Economy- E. L. Grant, W. G. Ireson, R. S. Leavenworth, Wiley International Education, 7th Ed.

7 Management Information System- Davis G. B., Margrethe H . Olson, Tata McGraw Hill New Delhi, 2nd 1985.

8 Value Engineering: L.W. Zimmerman, G. D. Hart, CBS publishers & distributors.

REFERENCE BOOKS

1 CPM in Construction Practice, Antill J. M., John Wiley and Sons.

2 Construction Project Management – Planning, Scheduling and Control- Chitkara K.K., Tata McGraw Hill Publications New Delhi, 4th Ed. 2002.

3 Construction Planning and Management through System Techniques: Verma M., Metropolitan Publication, 3rd Ed. 1985.

4 Construction Project Management- Bennett J. M. Clough R. H., Butterworth's Wiley John, New Delhi, 1972.

5 Construction Scheduling with Primavera Enterprise- Marchman D.A., Thomson/Brooks- Cole.

6 Engineering Economics - L.P. DeGarmo, W.G.Sullivan, J.A.Bantadelli, McMillan India Co. New Delhi, 8th Ed. 1984.

7 Manual of Construction Project Management- S. K. Guha, Thakurti, K. R. Shah, MultiTech Publishers.

8 Management Information System- Gupta R.C., CBS, New Delhi.

9 Value Engineering in the Construction Industry: Dell'lsola, A. J., Construction Publication Company.

10 Value Analysis in Design & Construction: O'brien J. J., McGraw Hill Publications

11 Value Engineering in Project Management: P. Krishnan, K R Saxena, Oxford and IBH Publishing Co. Pvt. Ltd., 1995

T.E. (CIVIL ENGINEERING) PART- II
TRANSPORTATION ENGINEERING II

Teaching Scheme:

Lectures: 3 hours per week

Examination Scheme:

Theory paper: 100 marks
Term Work: 25 Marks

Course Objectives

1. Study of various components of a railway track and geometric design of curves along railway tracks.
2. To impart knowledge of functioning of railway points, crossings and junctions.
3. To learn about the aircraft characteristics, airport planning and air traffic control.
4. To introduce the students to docks and harbor engineering.

Course Outcomes

On completion of the course, the students will be able to:

1. Perform geometric design for the railway tracks.
2. Plan the layout of different types of air terminals.
3. Carry out the surveys for layout of railways, airports and harbors.

SECTION-I

RAILWAY ENGINEERING

UNIT 1: Introduction to Railway Engineering **(05)**

History of Indian Railways- Component parts of railway track, Wheel and axle arrangements, Coning of wheels, Various resistance and their evaluation, Hauling capacity, Tractive effort, Stresses in railway tracks, Stresses in rail, Stresses in sleepers, Stresses in ballast, Formation.

Unit 2: Permanent way component Parts **(05)**

Types of rail section, Creep- wear and failure in rails, Rail Joint, Welding of rails, Sleeper requirements and types, Tracks fixtures and fastenings, Bearing plates, Anti-creep device, Check and guard rails. Ballast requirements, Specifications, Formations, Cross sections, Drainage.

Unit 3: Geometric Design **(05)**

Alignment, Horizontal curves, Super elevation, Equilibrium cant and cant deficiency, Length of transition curves, Gradients and grade compensation, Vertical curves.

Unit 4: Points and Crossing **(05)**

Functions of turn outs, Design of simple turn out, various types of track junction and their configurations.

Unit 5: Signaling and Interlocking **(04)**

Control of Train movement and monitoring, Types of signals, Principle of interlocking, Modernization of railway and railway tracks, High speed tracks.

SECTION- II

AIRPORT ENGINEERING

Unit 6: Air transport development **(03)**

Airport scenario in India-Stages of development, Aircraft characteristics, Airport planning, Site selection, Obstruction and zoning laws, Imaginary surfaces. Approach zone and turning zones.

Unit 7: Runway and Taxiway design **(08)**

Typical Airport layout, Element of runway, Orientation and configuration, Basic runway length and correction, Geometric design elements, Taxiway design, Exit taxiway, Separation clearance, Holding Aprons, Terminal building, Gate position.

Visual Aids and Air traffic Control:

Airport marking and lighting, Air way and airport traffic control, Instrumental landing Systems and other navigation aids.

Unit 08: Dock and Harbours Engineering **(10)**

Hydrographic Survey, Sea and tide, Wind Waves & cyclone, Siltation and erosion, Ship feature, Traffic forecasting, Harbour layout, channel basin and berth, Breakwater, Jetties Dolphins & mooring, Berth for crude oil, Locks, Dry dock and slipwell, Carbohydrate equipment, Apparent, Transit shade, Ware Houses, Navigation Aids.

TERM WORK

Assignment on each chapter and field visit report shall be submitted by the students.

TEXT BOOKS

1. A Text book of Railway Engineering by Saxena and Aror, *DhanapatRai& Sons Publication.*
2. Harbour, Dock and Tunnel engineeringby R. Shrinivasan, *Charotar Publishing House.*
3.Railway Engineering by Rangwala, by *Charotar Publication.*
4. Airport Engineering by G.V. Rao.

REFERENCE BOOKS

1. Railway Engineering- by Aggarwal M.M.
2. Railway and track Engineering- by Mundrey J.S.
3. Indian Railway permanent way manual – 1986.
4. Planning and Construction of Docks and Harbors–Quinn.
5. Docks and Harbour Engineering Oza, *Charotar Publication House.*
6. Airport Planning & Design *by Khanna & Arrora.*

T.E. (CIVIL ENGINEERING) PART II
STEEL STRUCTURAL DESIGN AND DRAWING

Teaching Scheme:

Drawing: 4 hours per week

Examination Scheme:

Term work: 50 marks
Oral Exam: 25 marks

Course Objectives

This course aims to provide the understanding of the following aspects of the steel structures as per IS 800: 2007(General Construction in Steel)

1. The detailed structural design and drawing of industrial shed with roof truss, gantry girder, roof and gantry columns, bracing system, column bases
2. The detailed structural design and drawing of building frames/ foot bridge/ welded plate girder
3. To provide training on application software for analysis and design of steel structures

Course Outcomes

Upon successful completion of the course, the students should be able to analyze and design the following steel structures as per BIS 800: 2007(General Construction in Steel)

1. Design and prepare drawings of the various components of industrial shed with roof truss or portal frame or gable frames
2. Design and draw the various components of building frames/ foot bridge / welded plate girder
3. Student will be able to select and use appropriate design software for analysis and design.

TERM WORK

The term work shall consist of detailed structural design and drawing of the following steel structure along with necessary drawings.

1. INDUSTRIAL SHED

Design of industrial shed including roof truss, purlin, gantry girder, roof and gantry columns, bracing system, column bases and connections.

2. ANY ONE of the following:

a) WELDED PLATE GIRDER:

Design of welded plate girder, design of cross section, curtailment of flange plates, stiffeners and their connections.

b) FOOT BRIDGE

Influence lines, cross beam, main truss, Raker, joint Details, support details

c) BUILDING FRAMES

Building with Secondary and main beams, column and column bases, beam-to-beam connection, column-beam-connection, design of typical members.

Note:

1. Sample verification of analysis results shall be made by using software for any one problem.
2. Maximum number of students in a group not more than three to five for design.

Site visits: Report should contain structural details with sketches.

TEXT BOOKS

1. Design of Steel Structures, N. Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures, S.K. Duggal.
3. Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S. S, I K International Publishing House, New Delhi
4. Limit state design in Structural Steel by Dr. M. R. Shiyekar

REFERENCE BOOKS

1. Limit state design of Steel Structure by V. L. Shah & Gore, Structures Publication, Pune
2. Limit State Design of Steel Structures by D. Ramchandra & Virendra Gehlot, Scientific Publishers
3. Design of Steel Structures by K. S. Sai Ram, published by Dorling Kindersley (India) Pvt. Ltd.
4. Teaching Resource Material by INSDAG
5. Indian Standard Codes: IS 800-2007, IS 875-1987 Bureau of Indian Standards.
6. Steel Tables